Press Release

Bosch Rexroth delivers a drive & control solution for a Japanese “continuous jacking system”

Bosch Rexroth has received an order from GustoMSC to engineer, manufacture and commission the drive and control system for GustoMSC’s most recent model in its successful series of continuous jacking systems. It is intended for a Japanese construction vessel, allowing it to perform precise and high speed windmill installations at sea. The continuous jacking system (CJS) is based on innovative lifting functions, in which 48 hydraulic cylinders directed by a digital control work together seamlessly. Sensors and displacement sensor systems provide feedback for the complex cylinder movements. The CJS lifts the vessel out of the water in one fluid motion, turning it into a stable offshore “construction platform”.

Since the sixty's, Bosch Rexroth has been developing and delivering integrated drive & control solutions for what are commonly called jacking systems, usually on a turnkey basis. It has now delivered some fifty drive and control systems worldwide. These have not only been for lifting and installing oil and gas platforms and offshore windmills, but also for positioning and...
Press Release

stabilizing dredging, mining and construction vessels for offshore applications.

Controlled jacking

“Jacking up” literally means lifting, which is precisely the function of a Bosch Rexroth drive and control jack-up or jacking system. A continuous jacking system goes a step further, as it performs the “jacking” motion in a single, accurate and controlled movement. With its specialized knowledge of jacking principles and procedures, Bosch Rexroth has secured an important position in the global offshore world, building a close relationship with GustoMSC. In addition to designing and supplying the complete jacking system, which drastically reduces the so-called “splash zone” transition, they have also designed the Japanese vessel. Under normal weather and sea conditions the vessel is able to install windmills on the seabed in a single day.

Stable construction vessel

The CJS consists of four robust steel legs, with four movable jacks fitted around each leg, each connected to the piston rod of two hydraulic cylinders. The legs are first to be anchored into the seabed in a controlled manner, after which the vessel is lifted entirely out of the water, providing a kind of stable “construction platform” for erecting the windmill with the onboard cranes. Using hydraulically powered pins that drop into the holes in the legs, three jacks remain connected to the legs at all times during the leg and vessel movements. The “separate” fourth jack is then moved to the starting position, after which it is anchored with the pin, and another jack is sent from the end position to the starting position. This makes it possible to place the leg on/in the seabed in one uniform motion, allowing for three-dimensional stabilization of the vessel and for lifting or lowering it at a constant speed. The movement pattern is extremely complex. It is regulated by the controls, the cylinder displacement sensor systems and other various sensors. This means, for instance, that the cylinder of the jack that returns to the starting position moves much faster than the other cylinders that are lifting the vessel out of the water at that moment. This represents a new way of integrating hydraulics, electronics and software.

A total of 32 hydraulic lifting cylinders are active during the jacking up movement. There are another 16 cylinders for moving the anchoring pins, while the jacking system consists of valve blocks, the control system and specially designed software. Testing and commissioning takes place on site by GustoMSC in collaboration with Bosch Rexroth in Japan.
Press Release

Protection against extreme conditions

The extreme conditions found in the offshore industry (in particular salty and aggressive environments) place exceptional demands on the equipment used. This was a serious factor taken into account during the design phase, which was translated into a functional design, material choice and special facilities. To create durable hydraulic cylinder rods, Bosch Rexroth applies different Enduroq surface-protective techniques such as HVOF coatings, stainless steel welding and laser cladding. Both R&D and the procedures for applying high-grade protection under stringent quality standards are conducted in-house at Bosch Rexroth and are testaments to its quality guarantee. The Enduroq 2000 HVOF coating was used for the CJS on the Japanese construction vessel. HVOF stands for High Velocity Oxygen Fuel, a coating technique that also offers the option of applying a Cylinder Integrated Measuring System (CIMS). This measurement system, developed by Bosch Rexroth, is based on the grooves in the rod's parent material, and is read by a sensitive sensor through the protective layer. This enables the exact rod position to be determined with a precision within tenths of millimeters. The hardware and software have been integrated in the newest generation of CIMS sensors, forming the basis for Condition Monitored Maintenance, part of Bosch and Bosch Rexroth Industry 4.0 developments.

Modular Hydraulic Power Unit (MHPU)

The hydraulic control of the CJS is provided by a power unit from a Bosch Rexroth Modular Hydraulic Power Unit (MHPU) introduced at the end of 2016 and specifically designed for the Marine & Offshore market. A Lloyd’s Type Approval has been included in this program, but other Classifications are also possible, such as with ClassNK in this project. These high-end power units cover a power range of 350 to 3,000 kW at working pressures of up to 350 bars. They are easy to configure using a list of options, enabling the system to be made more economical, without compromising on reliability and efficiency. Efficient IE3 electric motors, which can drive one or more pumps, are employed for driving the pump units. The MHPU are also fitted with extra sensors and interfaces for Internet communications, preparing them for Industry 4.0 and condition monitoring. Finally, Bosch Rexroth’s worldwide service organization guarantees professional support including rapid on-site spare parts service (from stock).

Economical, precise, safe, and energy efficient: drive and control technology from Bosch Rexroth moves machines and systems of any size. The company bundles global application experience in the market segments of Mobile Applications, Machinery Applications and
Press Release

Engineering, and Factory Automation to develop innovative components as well as tailored system solutions and services. Bosch Rexroth offers its customers hydraulics, electric drives and controls, gear technology, and linear motion and assembly technology all from one source. With locations in over 80 countries, more than 31,100 associates generated sales revenue of approximately 5.4 billion euros in 2015.
To learn more, please visit www.boschrexroth.com

The Bosch Group is a leading global supplier of technology and services. It employs roughly 390,000 associates worldwide (as of December 31, 2016). According to preliminary figures, the company generated sales of 73.1 billion euros in 2016. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected industry. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group’s strategic objective is to create solutions for a connected life, and to improve quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is “Invented for life.” The Bosch Group comprises Robert Bosch GmbH and its roughly 450 subsidiaries and regional companies in some 60 countries. Including sales and service partners, Bosch’s global manufacturing, engineering, and sales network covers nearly every country in the world. The basis for the company’s future growth is its innovative strength. At 120 locations across the globe, Bosch employs 59,000 associates in research and development.

Reader Inquiries:

Tel.: +31 411 651 464
E-Mail: geert.vanderzalm@boschrexroth.nl
Address: Afdeling Marketing, Kruisbroeksestraat 1, 5281 RV Boxtel, NL
Internet: www.boschrexroth.nl